JUVENILE FORMS IN SOLANUM MITLENSE AND S. BLODGETTII (SOLANACEAE) AND THEIR IMPORTANCE IN TAXONOMY

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Plasticity of the phenotype is common in many plant genera. Familiar examples are the submerged and floating leaves of *Potamogeton,* the sun and shade leaves of deciduous forest trees such as *Quercus,* and the vernal and autumnal forms in *Panicum* (cf. Geobel, 1900; Van Steenis, 1954). Van Steenis (l.c.) has classified such phenotypic modifications under 4 general headings in which he recognizes 24 kinds of variation induced by the environment. One of these is juvenile forms, the condition in which young plants of a species are conspicuously different from mature ones in some character(s). The dimorphic effect of juvenile forms has contributed to the taxonomic difficulties in certain notoriously perplexing genera such as *Solanum.* In many woody tropical species of this genus, leaf shape and size and spinescence are especially variable, young plants often bearing no resemblance to mature ones. The juvenile forms of *Solanum mitlense* Dunal and *S. blodgettii* Chapman serve to illustrate the effect of this source of variation on taxonomic interpretation.

While collecting botanical specimens in Mexico during the summers of 1964 and 1965, I encountered *Solanum mitlense* on several occasions. At first I was inclined to believe that two species were involved, i.e., a large-leaved, prickly shrub type and a small-leaved, nearly unarmed tree type (Fig. 1). Further examination of inflorescences, flowers, stems and significant characters of other parts suggested that the shrub was only a juvenile form of the tree. This was substantiated later near Sola de Vega, Oaxaca when plants intermediate in age exhibited a complete transition from shrub to tree. At the site near Ixtapan de la Sal, Mexico, which was collected both years, the individuals that were robust shrubs in 1964 were medium-sized trees by 1965, had leaves intermediate in size and lacked prickles on their leaves and young branches.

This example of an extreme dimorphic habit reflects the importance of adequate collections of specimens and accurate descriptions on labels to facilitate taxonomic understanding in *Solanum.* Because of the great intrinsic variation in many *Solanum* species and simply because of their large size it is usually impossible to show more than a small fraction of the entire phenotype on a single herbarium sheet. Furthermore, juvenile forms and stump sprouts are often non-blooming and thus neglected by collectors.

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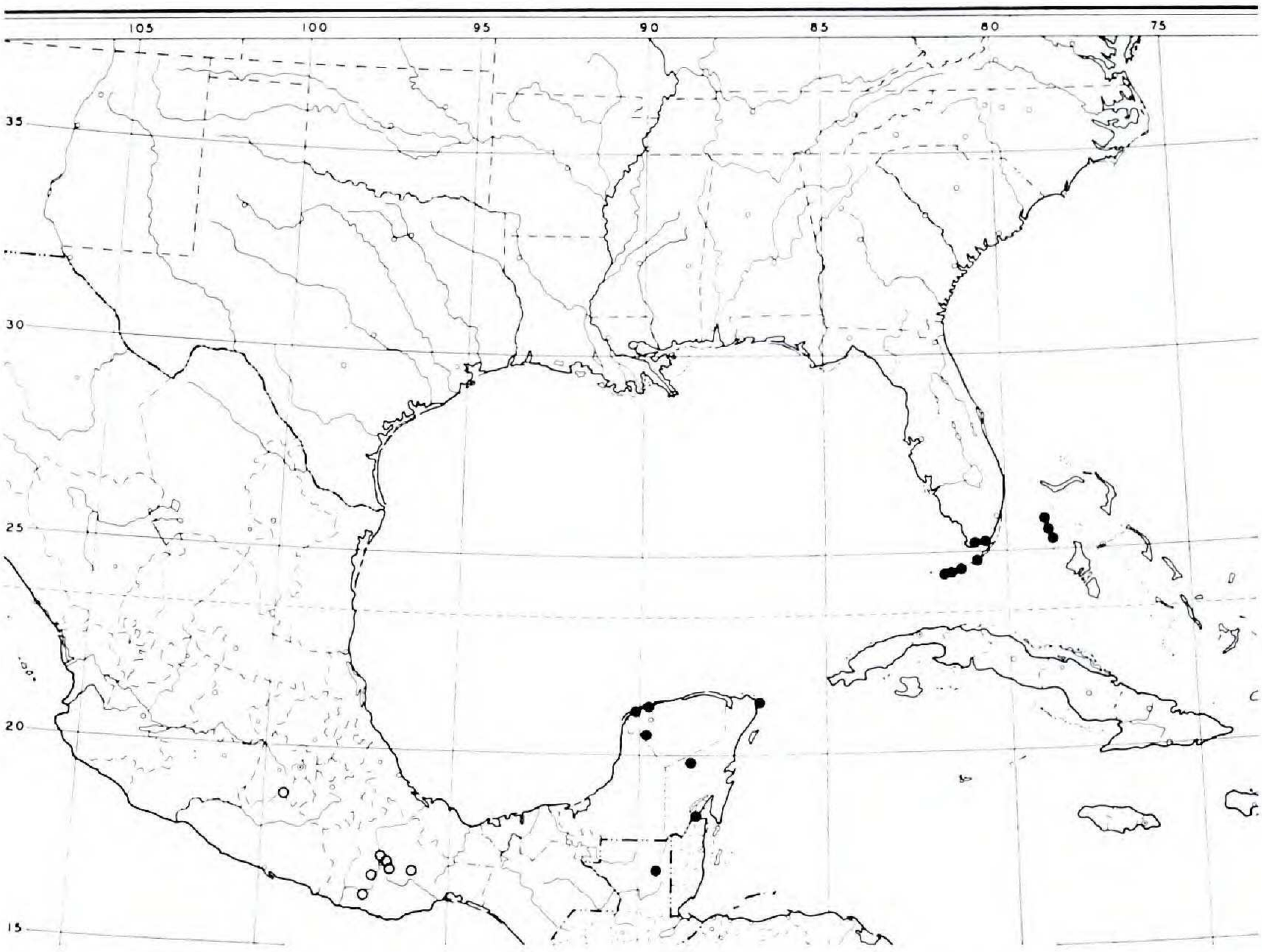
Fig. 1: Photograph taken near Ixtapan de la Sal, Edo. de México, Mexico of shrub and tree forms of *Solanum mitlense*. Several specimens of the shrub form (Mick & Roe 265), about 2 m high, are in the immediate foreground. A single tree (Mick & Roe 264), about 4 m high, is in the immediate background behind an unidentified small shrub.

To be useful, future *Solanum* collections should include all the obvious variation shown by single plants and as much as possible of that shown by the population, especially the extreme forms such as those in *S.*



Map: Closed circles represent *Solanum blodgettii*, open ones *S. mitlense*.

mitlense. Several sheets may be necessary to contain the variety of shapes, sizes and colors of leaves, stump sprouts, wood samples, fruits, etc. The "Inclusive Herbarium" technique of Anderson (1951) might well be employed. In a genus whose species are regarded as being highly variable, it is often crucial to be familiar with the ontogeny of the species in order to avoid misidentification.

The juvenile form of *Solanum blodgettii* is not so striking as that of *S. mitlense* but is significant in classification studies. This tropical and subtropical species is restricted in its range to the limestone islands and shores of Florida and the Bahamas while also reaching inland on the great limestone Yucatan Peninsula.[1]

From the time of its original description, most authors (cf. Chapman, 1860; Britton & Millspaugh, 1920; Small, 1913) have regarded *Solanum blodgettii* as an unarmed species, probably due to its general resemblance to *S. erianthum* D. Don[2] (Britton, 1912). Gray (1886), who seems to have suspected its true relationship, says ". . . Perhaps merely an un-

[1] *Solanum blodgettii* apparently has not previously been reported from Mexico. Its specimens are often misidentified as *Solanum bicolor* Willd.

[2] *Solanum verbascifolium* of authors, not L.

armed form of some normally prickly species . . .". That this latter interpretation is more nearly the correct one could be suspected from its long attenuate anthers characteristic of prickly species. This was confirmed when seed from Big Pine Key, Florida *(Roe 119)* and near Progreso, Yucatan *(Roe, Roe & Mori 1308)* produced 24 seedlings, all bearing small but numerous prickles. One young, non-flowering plant and 2 root-shoots from it collected in Florida *(Roe 104)* also were prickly but 13 young sprouts from mature plants were not (Roe 119, 120). As the greenhouse plants matured they no longer produced prickles so that, above 20 cm, their stems were unarmed just as in mature plants and their sprouts from the field. This evidence is scanty but may suggest that the production of prickles in this species is under hormonal control, the expression of prickles having evolved in response to environmental conditions at some time in the plant's history and now remains as only a vestigial character.

For purposes of identification only, of course, the prickly condition of the juvenile form in this case may be of little concern since, at least in the herbarium, we are usually dealing with mature plants and not with non-flowering seedlings or sprouts. However, if our interest is in species relationships, this prickly condition in young plants is of considerable importance since the character is used as a major taxonomic criterion in *Solanum* classification.

Dunal (1852), in the only world-wide monograph of *Solanum*, divides the genus into two major divisions, these based, in part, on the presence or absence of prickles. His Sectio *Pachystemonum* includes the unarmed species, while those normally armed are placed in Sectio *Leptostemonum*. Bitter (1919, 1922) describes Subgenus *Eusolanum* and Subgenus *Leptostemonum*, again using prickles as delimiting character. Morton (1944) supports division of the genus by pointing to the correlation of spinescence with a characteristic anther shape and mode of dehiscence as good evidence for two distinct natural groups within *Solanum*.

If we classify species on the basis of overall similarity (i.e., greatest correlation of characters), all stages of a plant's life cycle are important including those atavistic characters disappearing with maturation (Davis & Heywood, 1963). It appears that the prickly juvenile form of *Solanum blodgettii* has generally been unknown or disregarded by authors of floras and taxonomic studies. Probably many other *Solanum* species are even less well known. It would seem, therefore, that greater knowldege of individual species, based upon adequate collections, intensive study, and full appreciation of juvenile growth forms is essential to understand the woody Solanums.

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